

Sponsor: U.S. Geological Survey (**USGS**)
Science for Solutions: Linking Data and Decisions
NCTS # 27968-17 9th Biennial Bay-Delta Science Conference
November 15-17, 2016, Sacramento Convention Center
<http://scienceconf2016.deltacouncil.ca.gov/>

Title:

Watershed-scale modeling of land-use and altered environment impacts on aquatic weed growth in the Delta

Authors:

David Bubenheim, NASA-ARC

david.l.bubenheim@nasa.gov

Christopher Potter, NASA-ARC

chris.potter@nasa.gov

Minghua Zhang, UCD, 550 Alumni Lane, Davis, CA 95616

Abstract:

The California Sacramento-San Joaquin River Delta is the hub for California's water supply, conveying water from Northern to Southern California agriculture and communities while supporting important ecosystem services, agriculture, and communities in the Delta. Changes in climate, long-term drought, and water quality have all been suspected as playing role in the dramatic expansion of invasive aquatic plants and their impact on ecosystems of the San Francisco Bay / California Delta complex. NASA Ames Research Center, USDA-Agricultural Research Service, the State of California, UC Davis, and local governments have partnered under a USDA sponsored project (DRAAWP) to develop science-based, adaptive-management strategies for invasive aquatic plants in Sacramento-San Joaquin Delta. Critical to developing management strategies is to understand how the Delta is affected by both the magnitude of fluctuations in land-use and climate / drought induced altered environments and how the plants respond to these altered environments. We utilize the Soil Water Assessment Tool (SWAT), a watershed-scale model developed to quantify the impact of land management practices in large and complex watersheds on water quality, as the backbone for a customized Delta model – Delta-SWAT. The model uses land-use, soils, elevation, and hydrologic routing to characterize pesticide and nutrient transport from the Sacramento and San Joaquin rivers watersheds and loading into the Delta. Land-use within the Delta, as well as water extraction to supply those functions, and the resulting return of water to Delta waterways are included in Delta-SWAT. Hydrologic transport within the Delta has required significant attention to address the lack of elevation driven transport processes. Delta-SWAT water quality trend estimates are compared with water quality monitoring conducted throughout the Delta. Aquatic plant response to water quality and other environmental factors is carried out using a customized model component. Plant response to the range of water quality factors, response times, and altered temperature and light regimes of the Delta have required gap-filling studies to provide model parameters. Delta-SWAT provides a tool for evaluating temporal and spatial effects of land-use and altered environments in the Delta and contributing watersheds on aquatic weed growth. Using Delta-SWAT for simulation modeling allows evaluation of historic and current conditions as well as consideration potential climate change and management practice outcomes. Delta-SWAT adds to the scientific understanding of dynamics in the Delta and enhances development of science-informed, management strategies and practices.